III. Amendments to the Drawings

The Examiner objected to the drawings under 37 C.F.R. 1.83(a) as not showing every feature of the invention specified in the claims. The paragraphs beginning at page 13, line 24, page 14, line 13 and page 15, line 21 have been amended to more specifically identify and point out the claimed features of this invention, namely a first pre-circuit assembly and second pre-circuit assembly. Accordingly, the first pre-circuit assembly, designated at 112, is identified in Figure 4(a), and the second pre-circuit assembly, designated at 124, is identified in Figure 4(b). In view of the above, it is believed this objection is now moot and should be withdrawn.

V. Remarks

Reconsideration and reexamination of this application in view of the above amendments and the following remarks is herein respectfully requested.

After entering this amendment, claims 8-20 remain pending, with claims 14-20 being withdrawn (reconsideration of that withdrawal is requested below).

Species Election

The examiner has previously stated that only claims 8-13 read on species D of Figures 4a-e and that claims 14-20 read on non-elected species C of Figures 3a-e. The applicant respectfully requests reconsideration of that decision in that the current Office Action does not respond to the traversal presented in the previous Response. In further support of the above, it is submitted that Figures 4a-e also show each and every element of claims 14-20 and should be included in species D.

Looking at the elements of Claim 14, Figures 4a-e show a method for forming a multi-layer circuit board, designated at 110, made of a first pre-circuit assembly, designated at 112, and a second pre-circuit assembly, designated 124. *See* Figure 4b and Claim 14. More particularly, the first pre-circuit assembly 112 is made of a conductive core member, designated at 114, with a dielectric member, designated at 116, and an adhesive layer, designated at 118. *See* Figure 4a. The second pre-circuit assembly 124 is made of a second core member, designated at 126, with a first conductive member, designated at 130, and a second conductive member, designated at 128, attached to the top and bottom of the second core member, designated at 126. *See* Figure 4b.

Furthermore, the first pre-circuit assembly 112 also includes at least one hole designated at 120. *See* Figure 4a. The second pre-circuit assembly 124 is then registered with respect to the first pre-circuit assembly 112 effective to cause a portion, designated at 132, to reside above the at least one hole 120. *See* Figure 4b. The second pre-circuit assembly 124 is then attached to the adhesive layer 118, *see* Figure 4b and specification at page 15, lines 15-20, and conductive material, designated at

136, is inserted into at least one hole 120 thereby connecting the portion 132 of the second conductive member 128 to the core member 114, see Figure 4e.

In light of the above, and the amendments to the specification beginning on page 13, it is believed claim 14 reads on species D of Figures 4a-e. Therefore, Applicant requests that the Examiner include claim 14 in species D.

Looking at the elements of Claim 15, Figure 4c shows the selective etching of the second core member 126. See Figure 4c and specification at page 15, lines 21-25. In light of the above, and the amendments to the specification beginning on page 13, it is believed Claim 15 reads on species D of Figures 4a-e. Therefore, Applicant requests that the Examiner include Claim 15 in species D.

Looking at the elements of Claims 16 and 17, the conductive material 136 shown in Figure 4e is a solder that may be selectively inserted into at least one hole 120 using a compression printing technique. See specification at page 16, lines 9-22. In light of the above, and the amendments to the specification beginning on page 13, it is believed Claims 16 and 17 read on species D of Figures 4a-e. Therefore, Applicant requests that the Examiner include these claims in species D.

Looking at the elements of Claim 18, the conductive core member 114 shown in Figure 4a is made of copper. See specification at page 14, lines 5-8. In light of the above, and the amendments to the specification beginning on page 13, it is believed Claim 18 reads on species D of Figures 4a-e. Therefore, Applicant requests that the Examiner include Claim 18 in species D.

Looking at the elements of Claim 19, the second conductive member 128 is made of copper. See specification at page 14, lines 23-26 and page 15, lines 1-2. In light of the above, and the amendments to the specification beginning on page 13, it is believed Claim 19 reads on species D of Figures 4a-e. Therefore, Applicant requests that the Examiner include Claim 19 in species D.

Finally, looking at the elements of Claim 20, the second core member 126 is made of aluminum. See specification at page 14, lines 21-23. In light of the above, and the amendments to the specification beginning on page 13, it is believed Claim 20 reads

on species D of Figures 4a-e. Therefore, Applicant requests that the Examiner include Claim 20 in species D.

Claim Rejections – 35 U.S.C. § 112

Claims 8-13 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention.

Examiner states it is not known what "a first pre-circuit assembly and a second pre-circuit assembly" are in claim 8, lines 2-3. It is submitted that the amendments to the paragraphs beginning on page 13, at line 24, page 14 at line 13 and page 15 at line 21 clarify the meaning of the above language. Specifically, the first pre-circuit assembly 112 is recited as including a ground layer 114, a dielectric layer 116 and an adhesive layer 118. The second pre-circuit assembly 124 is recited as including a core metal portion 126, a first conductive layer 128 and a second conductive layer 130. Therefore, it is believed this rejection is now moot and should be withdrawn.

Examiner also states that the limitations "inserting conductive material into said aperture effective to connect said first portion of said second conductive layer to first conductive layer," and "a second pre-circuit assembly including a second conductive layer" in claim 8 at lines 3-4 and lines 13-15 are unclear. Claim 8 has been amended to clarify the above language. Therefore, in light of the amendments to Claim 8 and the specification beginning on page 13, have been amended to clarify this language. It is therefore believed this rejection is now moot and should be withdrawn.

Finally, examiner states that the phrase "selectively removing portions of said second pre-circuit assembly which are disposed above said first portion of the second pre-circuit assembly" in claim 9 at lines 3-5 is unclear. Claim 9 has been amended to clarify the above language and the specification beginning on page 13 has been amended to more closely correspond in language to the claim. Therefore, in light of the amendments to Claim 9 and the specification, it is believed this rejection is now moot and should be withdrawn.

Claim Rejections – 35 U.S.C. § 102(b)

Claim 8 was rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 3,801,338, to Akiyama et al ("Akiyama") and by U.S. Patent No. 4,404,059, to Livshits et al ("Livshits"). Applicant respectfully traverses these rejections.

The Examiner states that Akiyama discloses a method for connection within a multi-layer circuit board including a first pre-circuit assembly having a first conductive layer and a second pre-circuit assembly having a second conductive layer, the method comprising: forming an aperture within said first pre-circuit assembly, aligning the second pre-circuit assembly with the first pre-circuit assembly, attaching the first pre-circuit assembly to the second pre-circuit assembly, and inserting conductive material into the aperture to connect the first portion of the second conductive layer to the first conductive layer.

A careful reading of Akiyama, however, reveals that its conductive material is initially placed between the first conductive layer and the second conductive layer and that portions of this conductive material are removed in a later manufacturing process. The applicant's invention differs from Akiyama in that it requires forming an aperture within the first pre-circuit assembly and aligning the aperture with the second pre-circuit assembly such that the first portion of the conductive layer of the second pre-circuit assembly resides above the aperture. The first pre-circuit assembly having the aperture formed therein is then attached to the second pre-circuit assembly and then the conductive material is inserted into the aperture to connect the first portion of the second conductive layer to the first conductive layer. In Akiyama, the conductive material is placed between the first conductive layer and second conductive layer at an earlier stage and not into the aperture as claimed.

The Examiner states that Livshits discloses a method for connection within a multilayer circuit board including a first pre-circuit assembly having a first conductive layer and a second pre-circuit assembly having a second conductive layer, the method comprising: forming an aperture within said first pre-circuit assembly; aligning the second pre-circuit assembly with said first pre-circuit assembly such that a first portion of said second conductive layer resides above said aperture, attaching first pre-circuit

assembly to second pre-circuit assembly and inserting conductive material into the aperture effective to connect the first portion of the second conductive layer to the first conductive layer.

Like Akiyama, a careful reading of Livshits reveals that the conductive material is placed between the two conductive layers and then is later removed by a manufacturing process. Contrarily, the Applicants' invention places the conductive material into the aperture after the first pre-circuit assembly is attached to the second pre-circuit assembly.

Also, the Examiner stated that layer 21 of Livshits represents the claimed conductive material of the present invention. Reference numeral 21 in Livshits refers to a layer of varnish that is applied after the assembly of the integrated circuits. This layer of varnish is disclosed in Livshits as being non-conductive, and therefore cannot be the conductive material of the claim.

From this, it is submitted that Akiyama and Livshits fail to disclose the present invention and the rejections based thereon should be withdrawn.

Conclusion

In view of the above amendments and remarks, it is respectfully submitted that the present form of the claims are patentably distinguishable over the art of record and that this application is now in condition for allowance. Such action is requested.

Respectfully submitted,

April 21, 2005
Date

Eric J. Sosenko (Reg. No. 34,440)

EJS/DH/alr